

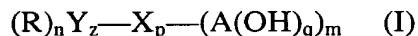
CLAIM AMENDMENTS

1. (Currently Amended) A dispersant-viscosity improver composition for lubricating oil compositions comprising the reaction product of ~~reactants comprising~~

(a) a hydrocarbon polymer having a number average molecular weight between 20,000 and 500,000 grafted with an α,β -ethylenically unsaturated carboxylic acid or functional derivative thereof containing from 2 to about 20 carbon atoms exclusive of carbonyl carbons and present in the range of about 0.01 to about 10 percent by weight based on the weight of the polymer; and

(b) an amine selected from the group consisting of

(b-1) a polyamine product having at least one condensable primary or secondary amino group, made by contacting at least one hydroxy-containing material (b-i) having the general formula



wherein each R is independently H or hydrocarbon based group, Y is selected from the group consisting of O, N, and S, X is a polyvalent hydrocarbon based group, A is a polyvalent hydrocarbon based group, n is 1 or 2, z is 0 or 1, p is 0 or 1, q ranges from 1 to about 10, and m is a number ranging from 1 to about 10; with (b-ii) at least one amine having at least one N-H group, and

(b-2) an acylated derivative of (b-1) containing at least one condensable N-H group, and optionally,

(c) at least one hydrocarbon group substituted carboxylic acid or anhydride

2. (Currently Amended) The composition of claim 1 wherein the ~~reactants-reaction product~~ further comprises ~~(d)~~ at least one preformed polyester containing at least one condensable hydroxyl group.

3. (Original) The composition of claim 1 wherein the hydrocarbon polymer is selected from the group consisting of

- (1) hydrogenated polymers of dienes;
- (2) hydrogenated copolymers of a conjugated diene with one or more vinyl substituted aromatic compounds;
- (3) polymers of alpha olefins containing from 2 to about 28 carbon atoms;
- (4) olefin-diene copolymers; and
- (5) star polymers.

4. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (1) a hydrogenated polymer of dienes, wherein the diene is a conjugated diene selected from the group consisting of isoprene, butadiene, and piperylene.
5. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (2) a hydrogenated copolymer of a conjugated diene with a vinyl substituted aromatic compound wherein the vinyl substituted aromatic compound is a styrenic monomer.
6. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (2) a hydrogenated copolymer of a conjugated diene with a vinyl substituted aromatic compound wherein the diene is selected from the group consisting of isoprene, butadiene, and piperylene
7. (Original) The composition of claim 5 wherein the diene is selected from the group consisting of isoprene and 1,3-butadiene and the styrenic monomer is styrene.
8. (Original) The composition of claim 7 wherein the hydrocarbon polymer is a block copolymer.
9. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (3) a copolymer of aliphatic olefins containing from 2 to about 28 carbon atoms wherein one olefin is ethylene.
10. (Original) The composition of claim 9 wherein the hydrocarbon polymer is an ethylene-propylene copolymer.
11. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (4) an olefin-diene copolymer wherein the olefin comprises ethylene and propylene and the diene is a non-conjugated diene.
12. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (4) an olefin-diene copolymer wherein the diene is a conjugated diene.
13. (Original) The composition of claim 11 wherein the diene is selected from the group consisting of 1,4-hexadiene, dicyclopentadiene, ethylidene norbornene, vinyl norbornene, and 4-vinyl cyclohexene.

14. (Original) The composition of claim 3 wherein the hydrocarbon polymer is (5) a star polymer wherein the arms are derived from dienes, wherein the diene moieties are substantially hydrogenated.
15. (Original) The composition of claim 14 wherein the star polymer comprises arms of polymers of dienes and vinyl substituted aromatic compounds.
16. (Original) The composition of claim 1 wherein the hydrocarbon polymer has a number average molecular weight ranging from about 20,000 to about 500,000.
17. (Original) The composition of claim 1 wherein the ethylenically unsaturated carboxylic acid or functional derivative thereof, is an α,β - unsaturated carboxylic acid or functional derivative thereof containing from 2 to about 20 carbon atoms exclusive of carbonyl carbons.
18. (Original) The composition of claim 17 wherein the ethylenically unsaturated carboxylic acid or functional derivative thereof, comprises at least one member of the group consisting of maleic acid, maleic anhydride, fumaric acid, itaconic acid and itaconic anhydride and esters of the acids.
19. (Original) The composition of claim 1 wherein grafting of the hydrocarbon copolymer is conducted at about 80°C to about 200°C in the presence of a free radical initiator.
20. (Canceled)
21. (Original) The composition of claim 1 wherein the amine is (b-1) the polyamine product and the grafted copolymer (a) is characterized by the presence of less than 2 moles of grafted carboxylic acid or functional derivative thereof per equivalent of hydrocarbon polymer.
22. (Original) The composition of claim 1 wherein the polyamine product (b-1) contains from about 0.1 to about 20% by weight of H₂O and further contains from about 0.05 to about 1% by weight of phosphorus.
23. (Original) The composition of claim 1 wherein the hydroxy-containing material (b-i) contains from 1 to about 10 hydroxy groups.

24. (Original) The composition of claim 1 wherein the hydroxy-containing material (b-i) is selected from the group consisting of glycerol, polyglycerols, ethylene glycol, ethanolamine, diethanolamine, tris-(hydroxymethyl)aminomethane, 2-amino-2-methyl-1,3-propanediol, ethoxylated polyamines, and polyoxyalkylene glycols.
25. (Original) The composition of claim 1 wherein the amine (b-ii) is an alkylene polyamine.
26. (Original) The composition of claim 25 wherein the alkylene polyamine is selected from the group consisting of ethylene polyamines, ethylene polyamine bottoms, and polyoxyalkylene polyamines.
27. (Original) The composition of claim 24 wherein the hydroxy containing material (b-i) is tris-(hydroxymethyl)aminomethane.
28. (Original) The composition of claim 1 wherein the amine (b) is (b-2), the acylated derivative of (b-1) containing at least one condensable N-H group.
29. (Original) The composition of claim 28 wherein the polyamine product (b-1) contains from about 0.1 to about 20% by weight H₂O and further contains from 0.05 to about 1% by weight of phosphorus.
30. (Original) The composition of claim 28 wherein (b-2) is the product obtained by reacting the polyamine product (b-1) with a carboxylic acid acylating agent.
31. (Original) The composition of claim 30 wherein the carboxylic acid acylating agent is a hydrocarbyl substituted succinic acid or anhydride.
32. (Original) The composition of claim 28 wherein the hydrocarbyl substituent is an aliphatic group containing from about 30 to about 200 carbon atoms.
33. (Original) The composition of claim 30 wherein the carboxylic acylating agent is characterized by the presence within its structure of from about 0.8 to about 2.0 succinic groups per hydrocarbyl substituent.

34. (Original) The composition of claim 30 wherein the carboxylic acid acylating agent is a monocarboxylic acid containing from about 8 to about 28 carbon atoms.
35. (Currently Amended) The composition of claim 1 ~~further containing boron~~ wherein the reaction product further comprises boron.
36. (Original) An additive concentrate comprising an inert normally liquid organic diluent and from about 4 to about 40 percent by weight of the composition of claim 1.
37. (Original) A lubricating composition comprising a major amount of an oil of lubricating viscosity and a minor amount of the composition of claim 1.
38. (Original) The additive concentrate of claim 36 further comprising from about 1% to about 10% by weight of at least one pour point depressant selected from the group consisting of polyacrylates, alkylated naphthalenes, styrene/alkyl maleate, and fumarate- and maleate ester/vinyl acetate copolymers.
39. (Original) A lubricating composition comprising a major amount of an oil of lubricating viscosity and a minor amount of the additive concentrate of claim 36.
40. (Original) The lubricating composition of claim 37 wherein the oil of lubricating viscosity is a synthetic oil.
41. (Original) The lubricating composition of claim 37 wherein the oil of lubricating viscosity is a mineral oil.
42. (Original) The lubricating composition of claim 40 wherein the synthetic oil is a polyalphaolefin oil.
43. (Original) The lubricating composition of claim 41 wherein the mineral oil is a hydrotreated oil.
44. (Original) The lubricating composition of claim 37 wherein the oil of lubricating viscosity comprises a mixture of mineral oil and synthetic oil.

RESPONSE AND REQUEST FOR RECONSIDERATION

Applicant has amended claims 1, 2 and 35, and deleted claim 20. Claims 1-19 and 21-44 are pending in the application. It is requested that the Examiner reconsider the present application in view of the above amendments and the following remarks.

Claims 1-44 are rejected under 35 U.S.C. 112, first paragraph, as based on a disclosure which is not enabling. Claim 1 is submitted above to address Examiner's rejection under 112, first paragraph. Claim 1 has been amended to specifically identify that the hydrocarbon polymer has a specific average molecular weight range. Furthermore, claim 1 has been amended to clearly identify that the α,β -ethylenically unsaturated carboxylic acid or functional derivative thereof contain from 2 to about 20 carbon atoms exclusive of carbonyl carbons and is present in the range of about 0.01 to about 10 percent by weight based on the weight of the polymer.

Claims 1-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Claim 1 has been amended to clearly identify the reaction product used in the dispersant-viscosity improver composition. Claim 2 has been amended to clearly identify that in one embodiment the reaction product of claim 1 further comprises at least one preformed polyester. Claim 35 has been amended to clearly identify that the reaction product of claim 1 further comprises boron.

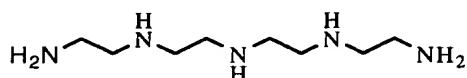
Claims 1-21, 23-28, 30-34, 36-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chung 4,803,003. Applicant respectively traverses.

Applicant's invention relates to a dispersant viscosity improver, which is the reaction product of a functionalized hydrocarbon polymer (a), a selected amine (b), and optionally a substituted carboxylic acid or anhydride (c). The amine is, in particular, a "condensed amine" made by reacting a polyamine with a hydroxyl-containing material described below.

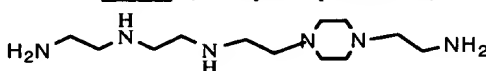
The Chung reference teaches an ethylene copolymer viscosity index improver dispersant additive useful in an oil composition. This disclosure teaches a viscosity index improver made from reacting an ethylene copolymer with a polyamine. The Chung reference does not directly or implicitly teach or suggest Applicant's specifically claimed invention, particularly as regards the amine component.

Applicant has turned to the description contained in Chung to determine whether anything in those passages teaches or suggest Applicants claimed invention. Chung teaches that the polyamine component will have two or more primary amine groups (see column 8 lines 14-15 and claim 1). Examples of these polyamine can include diethylene triamine, ethylene diamine, triethylene tetramine, tetraethylene pentamine ("TEPA") etc. (see: column 18 line 11 and column 8 lines 47-68). Examples of Chung's polyamine are illustrated by the following chemical structures:

Typical Polyamines



TEPA (triethylene pentamine)

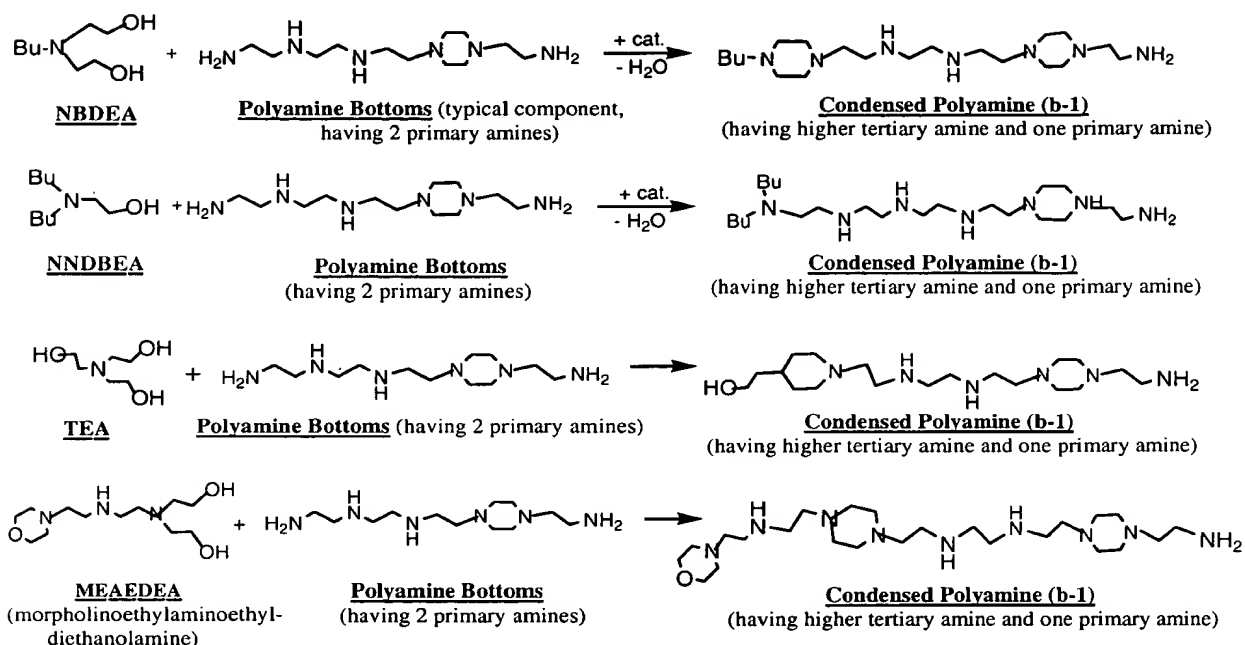


Polyamine Bottoms

(typical component, having 2 primary amines)

By contrast, in Applicant's claimed invention for the dispersant-viscosity improver, the reaction product comprises, as component (b), a polyamine product having at least one condensable primary or secondary amino group, made by contacting at least one hydroxy-containing material, (b-i), with (b-ii), an amine having at least one condensable N-H group (see Applicant's claim 1). This reaction generates Applicant's polyamine, which is a condensed polyamine typically having **only one primary amine group** in its structure. The condensed polyamine described in Applicant's invention is illustrated by the following chemical structures:

Condensations of Alkanolamines with Polyamines to Give (b-1)



(It is noted that if the hydroxyl-containing material is THAM, tris(hydroxyl-methyl) amino methane, the reaction product may be a mixture of materials having one and two primary amine groups, but it is believed that the reaction mixture will contain on average less than two primary amine groups.)

Contrasting the polyamine disclosed by Chung to the condensed polyamine in the Applicant's invention, the difference is that the Applicant's condensed polyamine has only a single primary amine group (or in any event, on average less than two such groups) whereas the polyamine disclosed by Chung is required to have at least two primary amine groups present. This difference is important because the single amine group gives the advantages of reduced engine deposits, improved dispersancy and sludge control and reduced seal attack or degradation, compared with polyamines having at least two primary amine groups.

Chung does not teach or suggest using a condensed polyamine with one primary amine group in the reaction product for a dispersant-viscosity improver. Applicants' respectfully submit that the claimed invention is not suggested by or obvious from the cited art. Applicants' respectfully request that the Examiner withdraw the rejection.

Claims 1-21, 23-28, 30-34, 36-44 are rejected under a judicially created doctrine of obvious-type double patenting as unpatentable over claims 1-51 of U.S. Patent No.

5,540,851. Contemporaneously filed with this response is a Terminal Disclaimer in compliance with 37 CFR 1.321(c), which overcomes the rejections on this ground.

For the foregoing reasons it is submitted that the present claims are in condition for allowance. The foregoing remarks are believed to be a full and complete response to the outstanding office action. Therefore an early and favorable reconsideration is respectfully requested. If the Examiner believes that only minor issues remain to be resolved, a telephone call to the Undersigned is suggested.

Any required fees or any deficiency or overpayment in fees should be charged or credited to deposit account 12-2275 (The Lubrizol Corporation).

Respectfully submitted,



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